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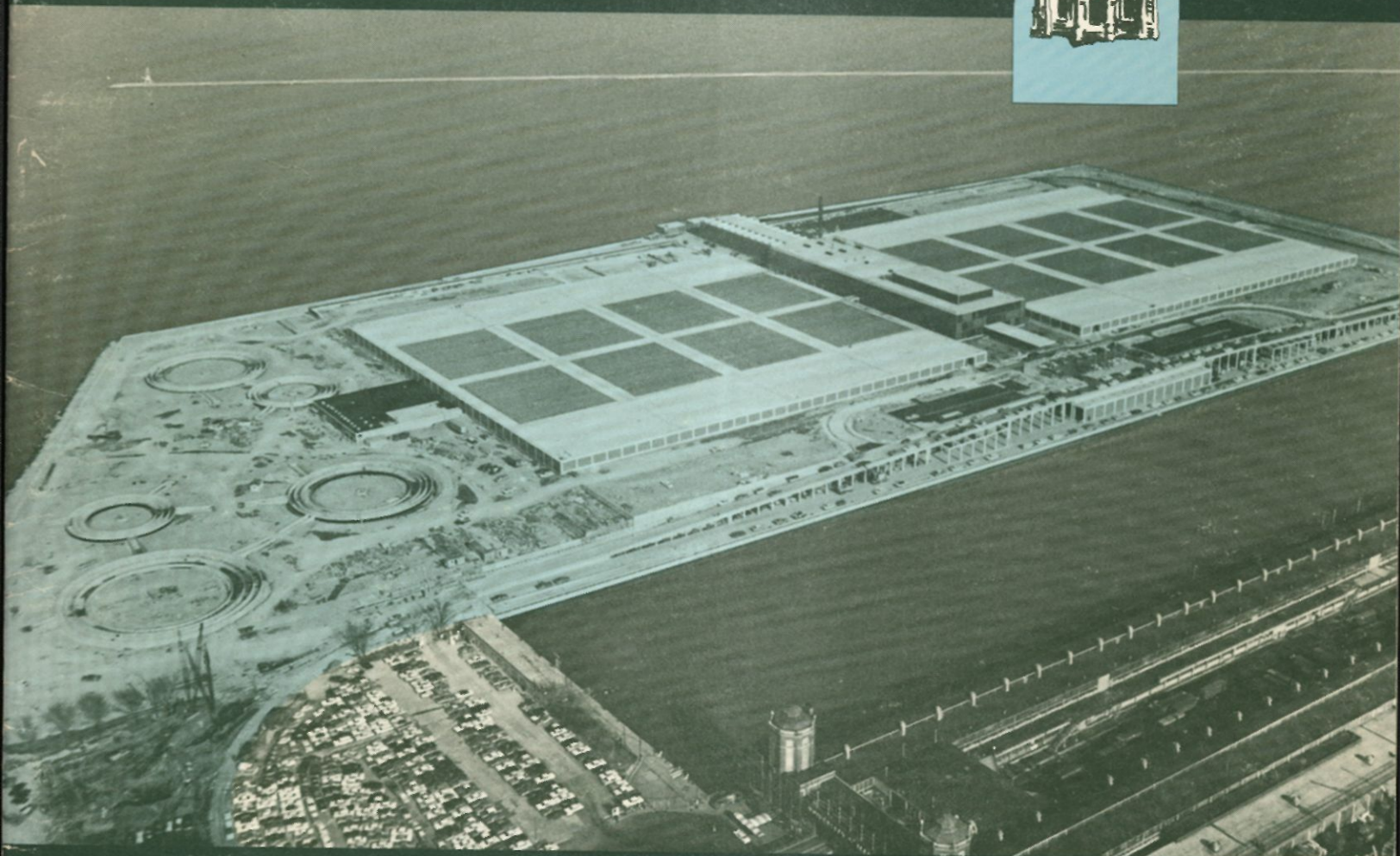
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DEPARTMENT OF

WATER & SEWERS

CITY OF CHICAGO - RICHARD J. DALEY, MAYOR



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ANNUAL REPORT

THE CHICAGO CITY COUNCIL

1964

HON. RICHARD J. DALEY

Mayor

JAMES C. MURRAY

President Pro Tem

JOHN C. MARCIN

City Clerk

MORTON GORDON

Deputy City Clerk

ALDERMEN

Ward

1. Donald W. Parrillo
2. William H. Harvey
3. Ralph H. Metcalfe
4. Claude W. B. Holman
5. Leon M. Despres
6. Robert H. Miller
7. Nicholas J. Bohling
8. James A. Condon
9. Dominic J. Lupo
10. John J. Buchanan
11. Matthew J. Danaher
12. Arthur V. Zelezinski
13. David W. Healy

Ward

14. Joseph P. Burke
15. Joseph J. Krska
16. Paul M. Sheridan
17. Charles Chew, Jr.
18. James C. Murray
19. Thomas F. Fitzpatrick
20. Kenneth E. Campbell
21. Samuel Yaksic
22. Otto F. Janousek
23. George J. Tourek
24. George W. Collins
25. Vito Marzullo

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26. Stanley M. Zydlo
27. Harry L. Sain
28. Alphonse R. Tomaso (a)
29. Thomas F. Burke
30. Daniel J. Ronan
31. Thomas E. Keane
32. Robert J. Salski
33. Robert Brandt
34. Rex Sande
35. Casimir C. Laskowski
36. Robert L. Massey (b)
37. Paul T. Corcoran (c)

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38. William J. Cullerton
39. Philip A. Shapiro (b)
40. Nathan J. Kaplan
41. Edward T. Scholl
42. Mayer Goldberg
43. Mathias Bauler
44. Thomas Rosenberg
45. Edwin P. Fifielski
46. Joseph R. Kerwin
47. John J. Hoellen
48. Robert J. O'Rourke
49. Paul T. Wigoda
50. Jack I. Sperling

(a) Deceased December 16, 1964

(b) Resigned December 6, 1964

(c) Deceased March 4, 1964

Robert F. Campbell, Record Clerk

Michael Coletta, Assistant Sergeant-at-Arms

William F. Harrah, Sergeant-at-Arms

Clement J. McDermott, Assistant Sergeant-at-Arms

Alec Busta, Assistant Sergeant-at-Arms

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City of Chicago, Department
ANNUAL REPORT,
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City of Chicago, Department
ANNUAL REPORT,
DEPARTMENT OF WATER
AND SEWERS, CITY OF
CHICAGO.

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The Honorable Richard J. Daley, Mayor
The Honorable Members of the City Council
City of Chicago, Illinois
Gentlemen:

In this annual report we have attempted to pictorialize the important events in the activities and accomplishments of the Department of Water and Sewers during 1964.

The Department is responsible for the conduct of the affairs of one of the largest utility operations in the world today. The water supply and drainage services, furnished through an underground network of over 8,000 miles of pipe in Chicago's 226 square mile area, are most vital to the health and welfare of the community in which we live.

We are pleased to report that the Department rendered very satisfactory levels of service around-the-clock, every day, throughout the year. It is important to note that the Chicago Water System passed a milestone in its history when on October 29, 1964, the new Central District Filtration Plant was officially placed in operation. This means that the Water System now operates the two largest water filtration plants in the world to furnish a high quality, filtered water to all of its consumers.

We, in this Department, are very conscious of the fact that the effective operation of Chicago's water and sewer utilities is basic to the stimulation of the growth of Chicago and its economy. An ample supply of pure water and adequate drainage facilities will attract people and industry to Chicago and be a significant help in keeping Chicago the vigorous leader that it is among the large cities of our nation.

We wish to thank you Mr. Mayor and the members of the City Council for your guidance and assistance which were most helpful in achieving departmental goals during the year. We also appreciate very much the help that was given to us by various other governmental agencies, industrial organizations and the public.

It would not have been possible for this Department to operate successfully without the dedicated effort of all of the employees. We wish to publicly thank them for the conscientious manner in which they discharged their responsibilities.

Respectfully submitted,

James W. Gardiner
Commissioner

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HIGHLIGHTS

★ Chicago's new Central District Filtration Plant, the largest water filtration plant in the world, began full-time, continuous operation on October 29, 1964. With a peak capacity of 1,700 million gallons a day, this plant will furnish a high grade, filtered water to a population of about 2,700,000 people, two-thirds of the total population served by the Chicago Water System.

★ Construction proceeded satisfactorily on the fifty percent expansion of the capacity of the South District Filtration Plant. When completed in mid 1965, this expansion project will increase the peak capacity of this plant to over 800 million gallons a day. Placed in operation in 1947, the Plant furnishes a high grade, filtered water to a population of about 1,500,000 people, one-third of the total population served by the Chicago Water System.

★ A total of \$22,468,089 was invested in the Water System. The 5-Year Water Works Capital Improvement Program, 1965-1969, calls for the investment of an additional \$54,971,000.

★ Water Distribution Division work forces constructed and placed in service 24 miles of water mains, ranging in size from 6 to 54-inches. These mains were installed in all sections of the City and improved the water service to thousands of water consumers.

★ A little over 31 miles of new sewers, 881 manholes and 1,398 catch basins, at a total cost of approximately \$3,957,000, were added to the public sewer system. These new sewers and appurtenances improved drainage throughout the City.

★ The new 10,582-foot, 54-inch feeder main constructed from the Thomas Jefferson Pumping Station to the Lake View Pumping Station area proved itself in 1964. The operation of this main made it possible to place the Lake View Pumping Station on standby service most of the year.

★ Plans and specifications were completed for a new automatic, remote-controlled electric pumping station to be located in the Lake View area which will be used as a peaking station to meet high water demands in this area during the summer months. This station will fortify the water supply service in this area and allow for the complete deactivation of the old Lake View Pumping Station now on standby service.

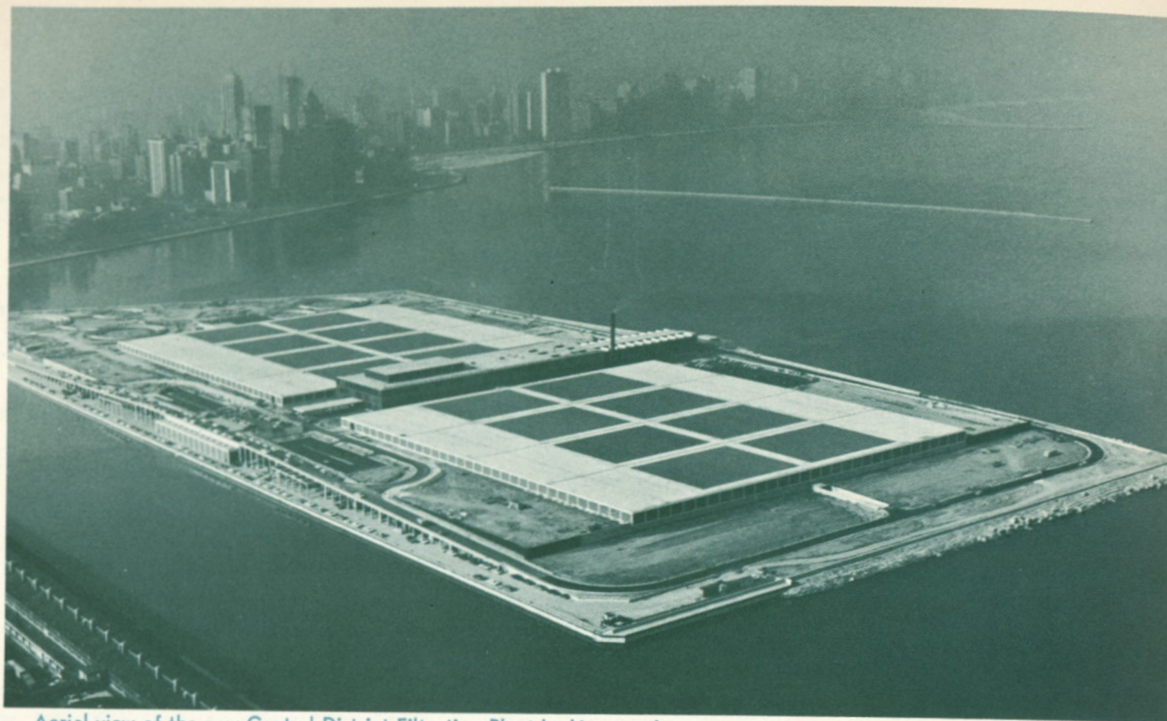
★ Water Distribution engineering forces continued their successful pioneering of a new type of electronic leak detection equipment and, during the last 20 months, approximately 80 percent of the over 4,000 miles of pipe in the distribution system were checked for leakage. In 1964, 3,260 leaks were detected and stopped on 2,297 miles of pipe. Based on the present tempo of this program, it is anticipated that all of the pipe in the distribution system can be checked for leaks about once every two years.

★ A total of 382,717 million gallons of water, an average of about 1,046 million gallons a day, was pumped by the pumping stations into the distribution system. On June 30, the pumpage for the day was 1,529.97 million gallons, and on June 29, at 3:00 p.m., the pumpage was at a daily rate of 1,888 million gallons, both new record pumpages for the Chicago Water System.

★ The gross cash collections made by the Collection Division totaled \$55,987,421.08, an increase of \$287,989.92 over 1963. This total included \$43,950,028.06 from metered accounts, \$11,812,294.08 from assessed accounts, \$76,559.28 from sewer rental accounts and the balance from miscellaneous sources.

★ Bureau of Sewers survey crews ran 138 miles of precise levels to establish 198 street grades and 18 standard bench monuments and ordinary benches.





Aerial view of the new Central District Filtration Plant looking northwest.

THE NEW CENTRAL DISTRICT FILTRATION PLANT

The Chicago Water System's new Central District Filtration Plant, under construction since 1954, officially went into full operation furnishing a high grade filtered water to the Central and North District tunnel systems

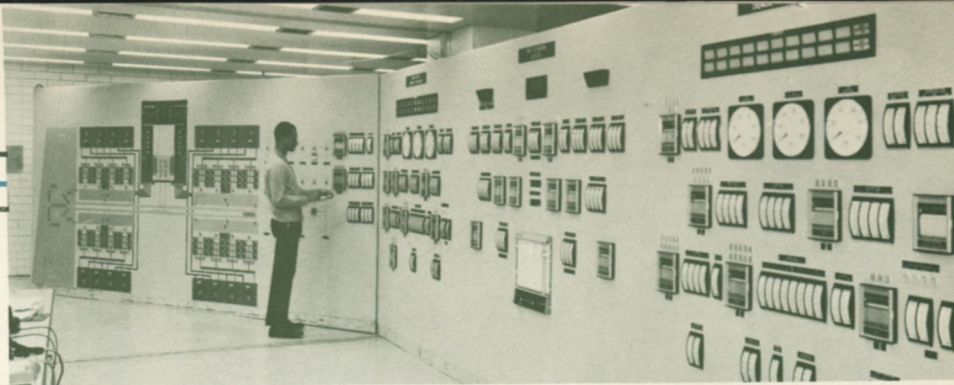
on October 29, 1964. Pumpage for the first full day of operation was 738 million gallons of water to users in the area of Chicago north of 39th Street and the 34 contiguous suburban towns using Chicago water. Plant pumpage for November, the first full month of operation, was 19,964 million gallons or an average of 655 million gallons per day. The peak hour was at a rate of 1,060 million gallons per day.

The Plant, located on Chicago's lake front north of the Navy Pier, is by far the largest water treatment facility in the world. It is rated at 960 million gallons per day but it is capable of safely treating water at a rate of 1,700 million gallons per day. The 61 acre cofferdam enclosed site will add to the beauty and utility of Chicago's shore line. A 10½ acre plot to the west of the Plant will be an attractively landscaped public park. The main features of the park will be five large fountains with colored lighting and an observation platform that will look out over the lake shore skyline. The balance of the site surrounding the plant structures is also to be landscaped beautifully.

It is of interest to note here that in 1964 the Illinois Section of the American Society of Civil Engineers nominated the Central District Filtration Plant for the "Outstanding Civil Engineering Achievement of the Year" award for 1965.



Mayor Richard J. Daley inspects one of the chemical application control panels shortly before activating the new Central District Filtration Plant to supply some 2.7 million people in the north and west sections of Chicago and 34 adjacent suburbs with pure, clear filtered water.



Engineer takes readings from central control panel.

The 51 acres of plant structures contain a total volume of 312 million gallons of water "in process." Therefore, at the design rate of 960 million gallons a day, it would take a drop of water 7.8 hours to pass completely through the plant treatment and filtering processes, through the filtered water reservoirs and out the plant outlets to the tunnels supplying the outlying pumping stations.

The settling basins, filters and clear wells are divided into four identical quadrants, with a central head house located between the two west and the two east quadrants, affording an unparalleled flexibility in the operation of the Plant. Each quadrant has four settling basins, 24 filters (6 to a gallery) and two clear wells.

Plant operations will be monitored by a computer-data logger system and liberal use will be made of telephones, loud speaker paging and closed circuit television to provide fast and accurate communication throughout the Plant.

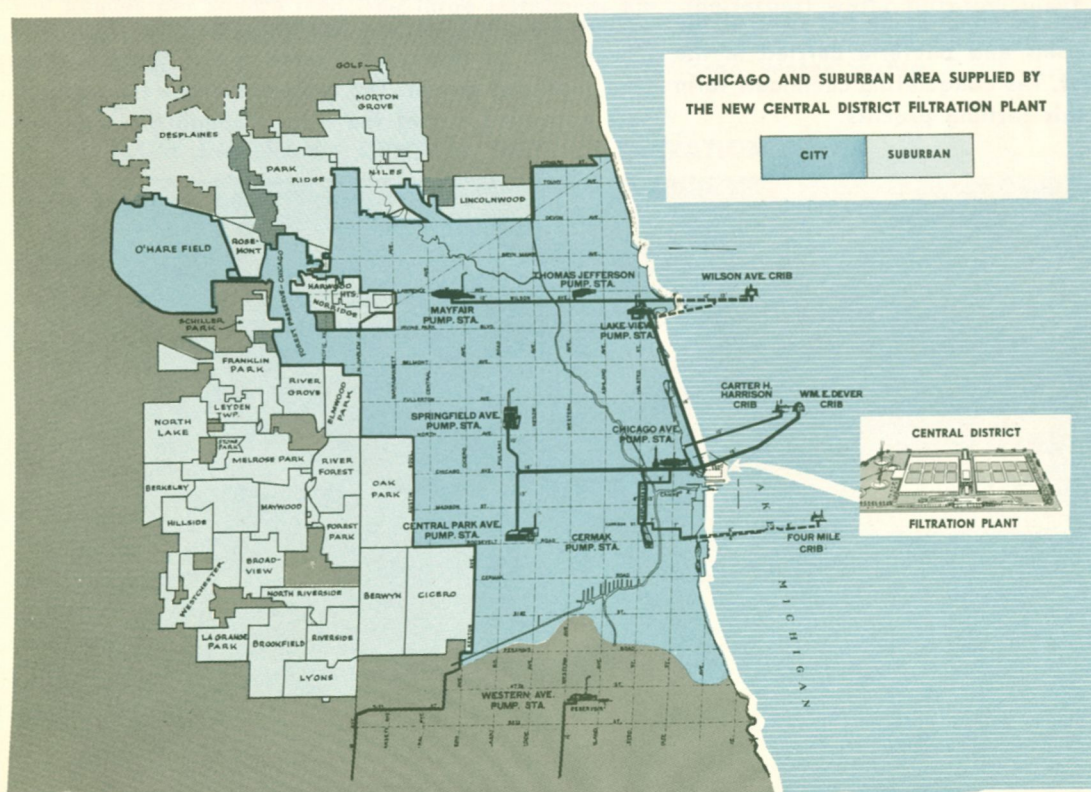
The major plant elements and treatment components are described in the paragraphs that follow, arranged in logical "flow-through" order. See flow diagram on page five.

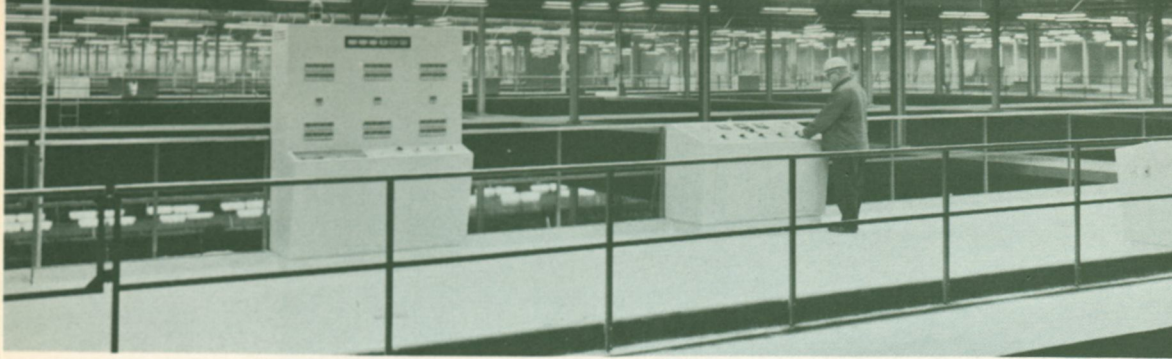
INTAKE—Fourteen sluice gates, each 8 by 10 feet in area, and two 96 inch butterfly valves control the

flow of raw water into the Plant. Eight sluice gates control the flow in the 20 foot diameter tunnel from the Dever Crib located 2½ miles out in the Lake and the other gates control the flow from the shore intake. Raw water requirements of over 1,000 million gallons per day will have to be supplemented by opening the shore intake gates to draw from the 25 foot deep water at the north end of the Plant.

TRAVELING SCREENS—Eight traveling fish screens, with an effective screening area of 1800 square feet, are installed between the intake and pump suction basins. These units screen out all fish, aquatic weeds and trash. The screens are designed to rotate and are cleaned by high pressure water jets.

LOW LIFT PUMPS—There are eight low lift pumps installed with provisions for two future additional pumps. Low lift pumps raise the raw water approximately 21 feet to permit gravity flow through the Plant. The pumps are submerged, vertical, mixed-flow type, a fairly recent development for high capacity, low pressure applications. Six of the pumps are rated at 260 million gallons per day and are driven by 1,500 horsepower synchronous motors. The two "small" pumps are rated at 170 million gallons per day and are driven by 1,000 horsepower motors. One of the large pumps can raise 7½ tons of water per second through a 21 foot lift.





Engineer at one of 96 filter control tables. At his left is an automatic backwash control unit.

CHEMICAL APPLICATION — Chemicals are fed into the water at eight application channels (each one an 8 x 12 foot concrete conduit) which lead from the low lift pump discharge basins to the sixteen settling basins. Seven chemicals can be fed at a total of 67 different points of application from the raw water intake to the two filtered water outlet tunnel shafts.

The chemicals used in treating the water include chlorine to kill bacteria; anhydrous ammonia to stabilize the chlorine residual and to decrease chlorinous tastes; aluminum sulfate (alum) or oxidized ferrous sulfate to produce coagulation; lime to buffer the water and to counteract corrosion in the water main distribution system; activated carbon to remove objectionable tastes and odors; and fluoride to reduce caries in children's teeth.

The highly automated chemical feeding system is probably the most advanced ever installed in a water treatment plant. All chemical application will be regulated through control systems paced by the flow of water through the particular channel being fed. An average of 65 tons of chemicals will be received and applied every day.

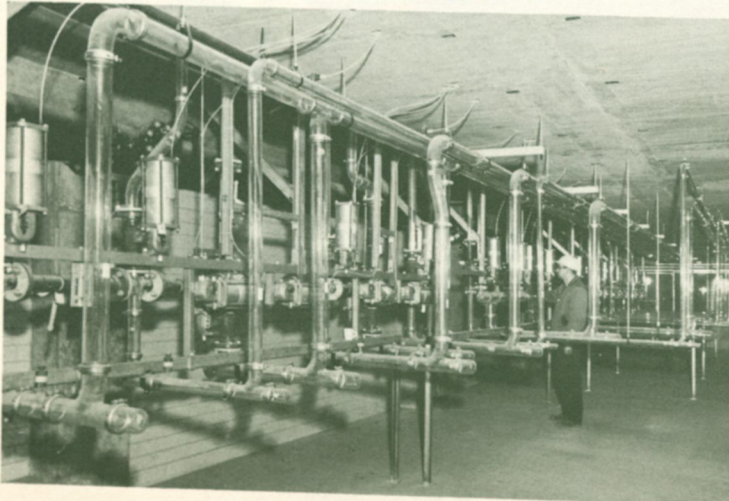
SETTLING BASINS—In the settling basins the rate of flow is very slow and, as much as 85 per cent of the sediment, micro-organisms and bacteria carried in the raw water will settle out. The coagulating chemicals form "floc" to accelerate this settling process.

Each basin has an upper and lower level and there are four mixing channels. Huge, slow-speed paddles gently stir the water and "promote collisions" between the gelatinous floc particles. This causes the floc particles to grow in size and entrain sediment. Sediment scrapers are installed in the upper level of each basin to scrape the accumulated sediment to a sump where it is piped out to the wash water drain. There are a total of 160 scraper and collector units.

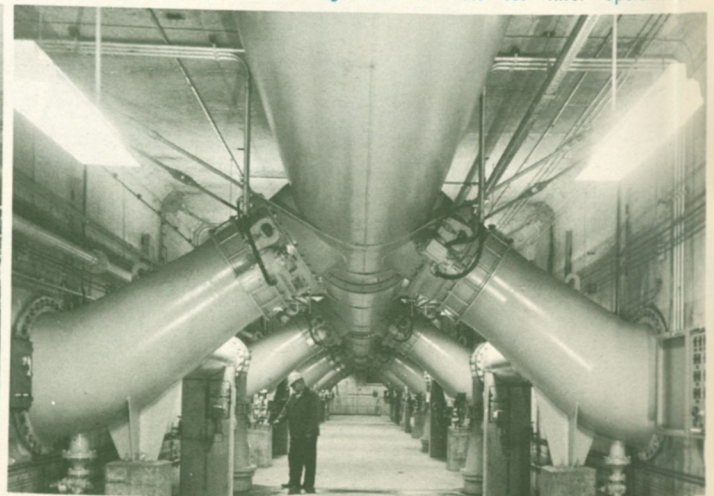
The water from the settling basin outlets is conveyed to the sand filters through the settled water collector and header system. These concrete conduits in the four quadrants total more than 1 1/2 miles in length.

FILTERS—There are 48 filter units located in each of the two 10 acre filter buildings, 24 in each quadrant. Each of the filters is rated at 10 million gallons per day when filtering at a rate of 2 gallons per minute per square foot of sand surface. A filter consists of layers of sand and gravel and a cast iron pipe underdrain system. There is a total of 61 miles of 4 inch cast iron pipe in the underdrain systems of all of the filters. While filtering, the settled water passes downward through the sand and gravel and the filtered water is collected in the underdrain system and piped through a flow rate control system to the storage clear well below the filters. When the sand surface becomes clogged, the filter is "washed" by reversing filtered water upward through the sand and gravel. The sediment and wash water then are conveyed out of the filter through the wash water

Tempered glass piping carries chlorine under vacuum from chlorinator units to 21 points of application.



One of 16 filter pipe galleries showing piping and controls for filter operations.



Eight synchronous electric motors having a total of 11,000 horsepower drive vertical pumps with a total rated capacity of two and one half billion gallons per day.

drain system. Filter washing will be completely automatic with a gallery of six filters being washed sequentially, initiated by one pushbutton. This automatic system provides an optimum washing procedure, eliminates gaps between filter washes and permits as many as 400 washes per day, if required, during extremely short filter run periods.

FILTERED WATER STORAGE RESERVOIRS — The filtered water from the clear well storage below the filters flows through two filtered water collectors to the reservoirs. The clear wells and reservoirs have a combined storage capacity of 111 million gallons.

The two 1800 foot collectors run down the east-west center line of the Plant and terminate in the outlet control structure which contains a complex system for controlling filtered water flow to the reservoirs and to the two 16 foot diameter tunnel shaft outlets. There are 46 large sluice gates and butterfly valves in this system.

OPERATING CONTROL PANELS—There are seven panels or "stations" which are directly concerned with the control of plant operations: the 2 chemical application panels, the 2 filter operations center panels, the chlorine-ammonia panel, the pump control panel and the central control panel. The first three panel types have been described briefly at the appropriate points in the foregoing text.

The pump control panel is the "headquarters" for operation of all plant auxiliary equipment. The auxiliaries include six wash water pumps with a combined capacity of 170 million gallons per day, drainage pumps, plant water systems, hydraulic systems and other miscellaneous related equipment. There are fourteen separate air compressors serving six systems varying from 4 to 1,200 pounds per square inch. The three instrument air compressors have a combined capacity of 1,800 cubic feet per minute.

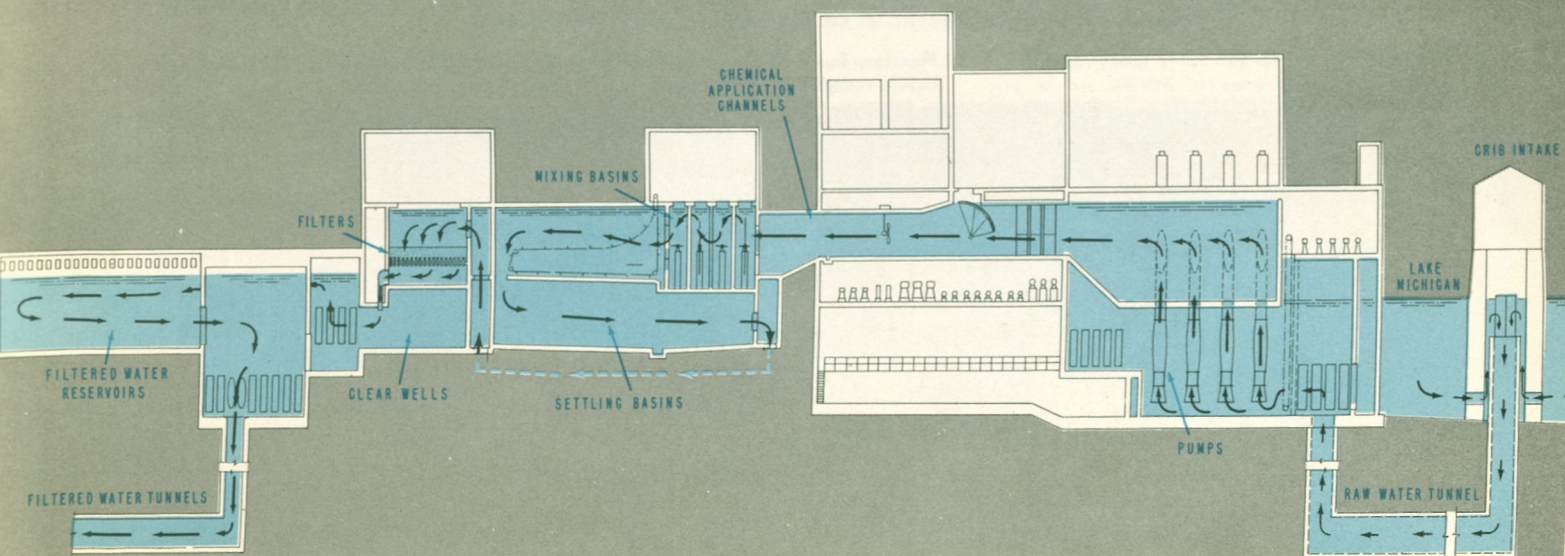


The central control panel is located at the intersecting center lines on the main floor of the Plant. Most of the 345 instruments on the 60 foot long panel board are simple indicators with provisions for obtaining trend recordings. All water flow, chemical feed, elevation, chemical analysis and meteorological information is transmitted to this panel board.

It is expected that a computer-data logger will be installed in the plant control center in 1965. The computer will be programmed to monitor all operations and will scan the 319 input signals at 5 minute intervals for "off-normal" functioning which will be logged as it occurs on the "off-normal" typewriter. All pertinent operating data will be logged on two logging typewriters on the hour—or on demand. The 24 hour totals and summary will be logged at midnight. The computer also will calculate dosages of chemicals applied, retain maximums and minimums and calculate averages.

There is little doubt that the placing in operation of the largest water filtration plant in the world in 1964, is a most important milestone in the history of the Chicago Water System.

TYPICAL FLOW DIAGRAM - CENTRAL DISTRICT FILTRATION PLANT



PURIFICATION

The activities of the Water Purification Division were considerably increased during 1964 when the Central District Filtration Plant was placed in partial operation during the summer months and officially, in full operation on October 29, as indicated elsewhere in this report.

The expansion construction which will add 40 more filters to the present 80 at the Division's other filter plant, the South District Filtration Plant, progressed on schedule. The substructure for the new settling basins and filters was completed in 1964 together with the installation of sediment scrapers, flocculators, drain piping, filter sand and auxiliary chemical feeding equipment. Contracts were let and work started on the filter piping and controls and for the superstructure housing the filter building. It is anticipated that the mixing and settling basins will be available for use during the Summer of 1965.

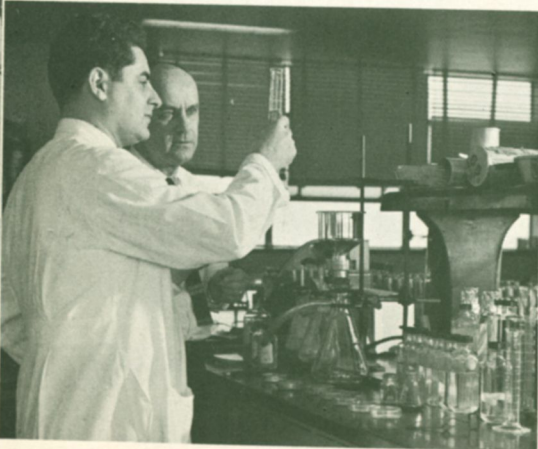
The South District Plant, which supplies a high quality filtered water to the south one third of Chicago and 27 contiguous suburbs using Chicago water, again set new output records. The Plant supplied an average of 385.5 million gallons of water a day in 1964, producing a maximum for a day of 590.7 million gallons on June 30 and at a maximum hourly rate of 682 million gallons a day at 6 p. m. on June 13. When the plant expansion program is completed, the rated capacity of the Plant will be increased from 320 to 480 million gallons per day, and the peak capacity will be increased to about 800 million gallons per day. The need for this expansion is apparent from the record pumpages set in 1964.

Odors caused by industrial pollution in the lake waters were much more severe in 1964 than in any recent previous year. The odors were present in the raw water supplies on 89 days, or 24 percent of the days in the year, compared with 72 days in 1963. The most severe odor periods occurred during the months of January and December, 1964 and were of the typical chemical and hydro-carbon odors prevalent in the Calumet Area. As a result there was a considerable increase in the cost of chemicals required to produce a high quality water in 1964.

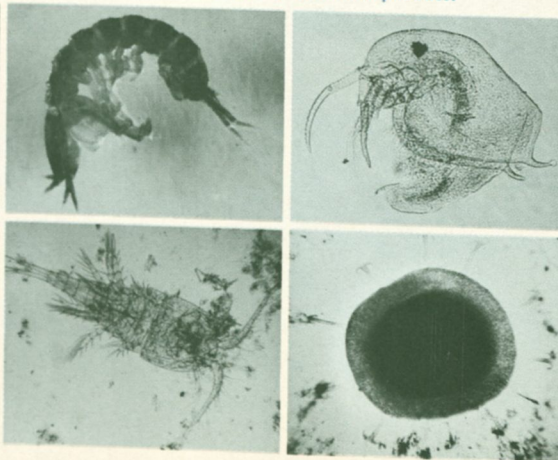
The Water Safety Control Section maintained 24 hour control over the chemical treatment of the water at the pumping stations, reviewed water works plans and recommended improvements, furnished sanitary supervision of new equipment installations and sterilized many miles of water mains, tunnels and shafts. The section also kept the lake under surveillance by making pollution surveys, dredging inspections and statistical studies of the field data. In the overall quality control program, 59,049 water samples were collected from Lake Michigan, the Calumet River System, intake cribs, filter plants, pumping stations and appropriate sampling points in the distribution system. All of this work was essential to assure a safe, sanitary water supply.

The chemical and bacteriological laboratories made 241,665 tests on the samples of water collected during the year to assist in monitoring the quality of the water supplied by the Chicago Water System. The electron microscope was particularly valuable for immediately examining water samples during emergencies. On several occasions during the year, a microscopic study was made of specimens of aquatic weeds from the intake screens and 139 samples from water main sterilization operations were examined to speed up the placing into service of these mains. A total of 4,347 tests were made by the electron microscope laboratory.

Bacteriologists making membrane filter test in analysis for bacteria.

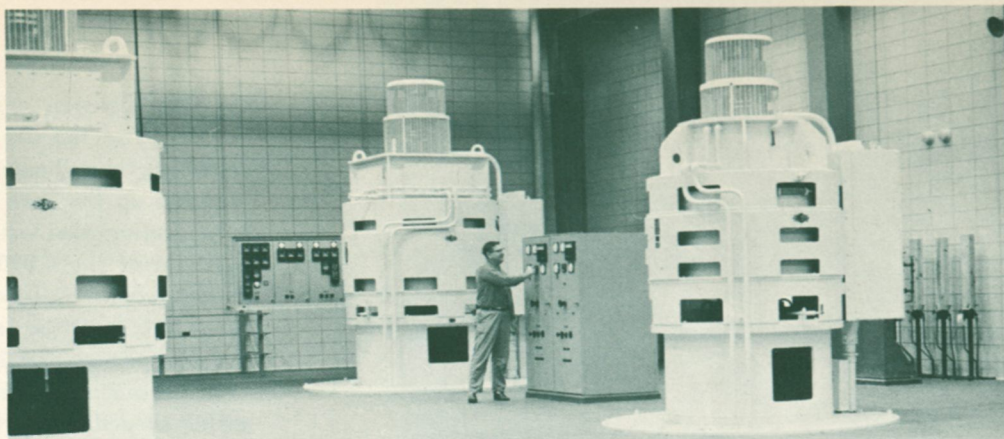


Plankton found in raw lake water before removal by filtration process.



Laboratory technician uses microscope to identify and count plankton in samples of raw water.





Three of the four motors that drive the vertical pumps at the Southwest Pumping Station showing control panels for pumps No. 2 and No. 4.

Pumps having a total capacity of 3,030 million gallons a day are installed in the eleven pumping stations operated and maintained by the Pumping Station Operation Division. This provides for reserve pumping capacity in each station even under peak load conditions and each station is able to alternate or change the pumping equipment in use whenever necessary without any interruption in the service.

The new two-mile, 54-inch feeder main constructed from the Thomas Jefferson Pumping Station to the Lake View Pumping Station area proved itself in 1964. The operation of this main made it possible to place the Lake View Pumping Station on standby service most of the year. The Thomas Jefferson Pumping Station has been able to maintain adequate pressures in the Lake View area and it is expected that the old Lake View steam station will be permanently retired from service in 1965.

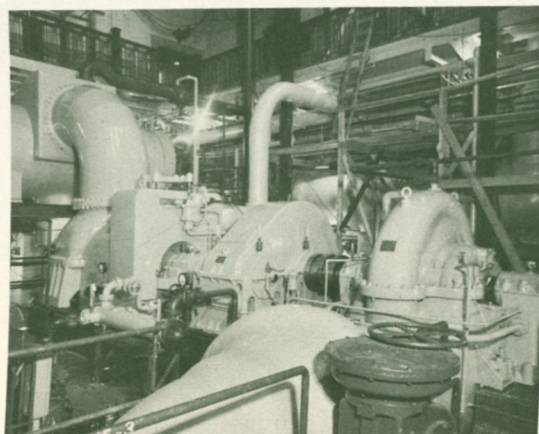
Plans and specifications were completed during the year for a new automatic, electric pumping station to be constructed at Wilson Avenue near Marine Drive. This station will have three

pumps with a total rated capacity of 105 million gallons a day, will be operated by remote control from the Thomas Jefferson Pumping Station and will furnish pumping capacity that will enhance the reliability of the service in the area. It is intended that the station will be used as a peaking station to meet the above-average water demands that may develop in this high-rise area during the summer months.

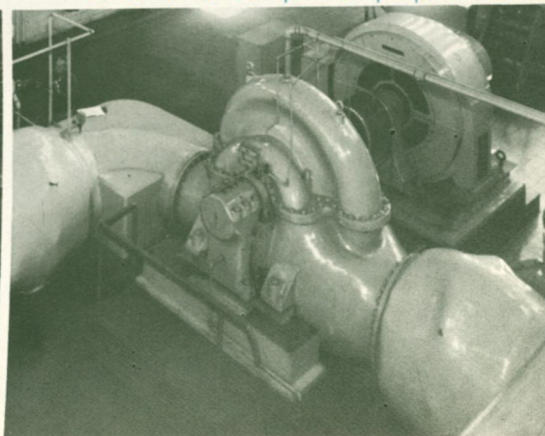
The pumping stations obtaining their water supply from the new Central District Filtration Plant were able to increase their capacities due to the higher water level maintained by the filter plant. Further, these same pumping stations ultimately will be relieved of their responsibility for chlorination of the water supply since the filter plant will chlorinate all water furnished by it.

The stations pumped a total of 382,717 million gallons without interruption, and established two pumping records during the year. On June 30, the daily pumpage was at a record 1,529.97 million gallons and at 3:00 p.m. on June 29, a record rate of 1,888 million gallons a day was recorded.

Centrifugal pump at the Mayfair Pumping Station—one of the six steam turbine driven pumps at this station.



Centrifugal pump at Chicago Avenue Pumping Station—one of six electric powered pumps in this station.



PUMPING

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Engineers check grade of 36-inch ductile cast iron water main installed in the old freight tunnel under the Chicago River.

DISTRIBUTION



The Division engineering forces have successfully pioneered in the use of a new type of electronic leak detecting equipment and methodology which has speeded up the leak detection program throughout the City. During the last 20 months, approximately eighty per cent of the 4,073 miles of pipe in the water distribution system had been checked for leakage using this new equipment. A total of 3,260 leaks were detected and stopped on the 2,297 miles of pipe checked during 1964. Based on the present tempo of this program, it is anticipated that all of the pipe in the distribution system can be checked for leaks about once every two years. It appears from our experience so far that a significant step forward has been taken in resolving one of the most serious problems confronting the Division, that of maintaining a comparatively tight distribution system.

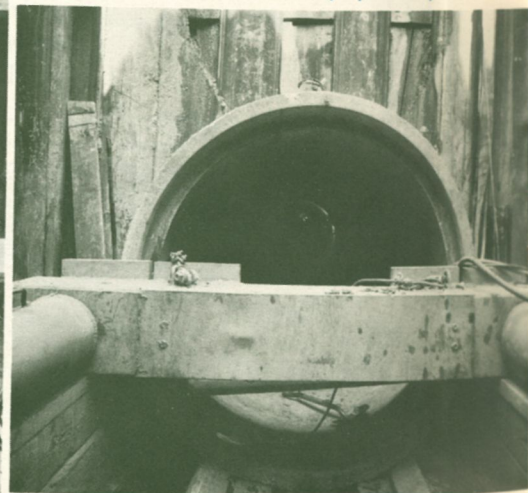
Distribution Division work crews installed a total of 24 miles of pipe in 1964, ranging in diameter from 6 inches to 54 inches. Something over 8 miles of the pipe installed were feeder mains 24 inches or larger in diameter. At the year end, there were 4,073 miles of pipe in the distribution system, ranging in size from 4 to 60 inches in diameter.

Water mains of various sizes were placed in service in all sections of the City to improve pressures and service to thousands of consumers. The principal water main installation projects completed were:

- ★ 3,000 feet of 36-inch diameter pipe in Oglesby Avenue from 79th Street to 83rd Street and in 83rd Street from Oglesby Avenue to Yates Avenue.
- ★ 10,772 feet of 36-inch diameter pipe in Stony Island Avenue from 79th Street to 95th Street.
- ★ 4,624 feet of 48-inch diameter pipe in 104th Street from Prairie Avenue to Maryland Avenue.
- ★ 3,122 feet of 48-inch and 4,642 feet of 54-inch diameter pipe in Seeley, Winnemac and Wolcott Avenues from Seeley Avenue and Leland Avenue to Wolcott Avenue and Bryn Mawr Avenue.



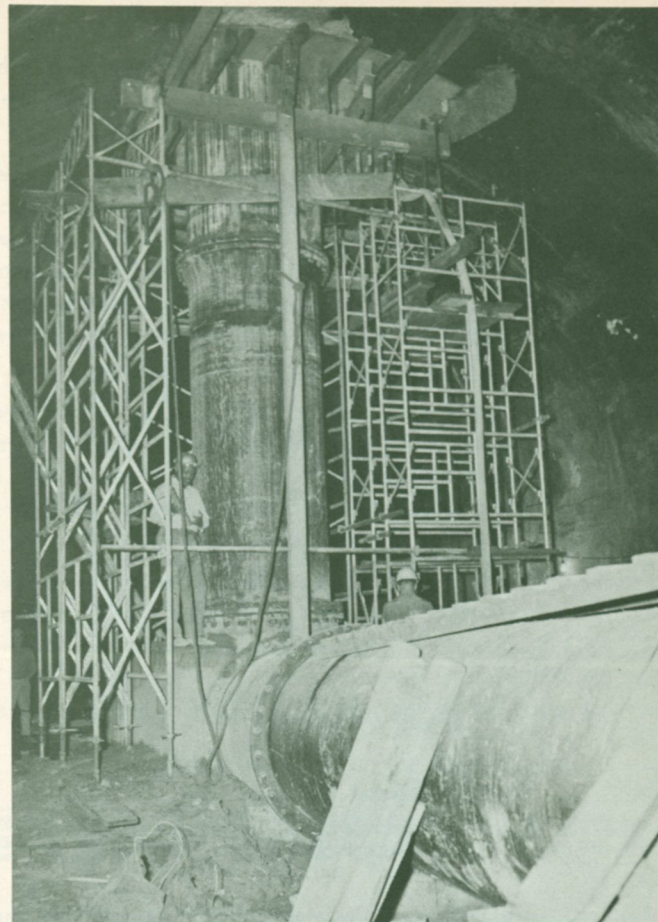
Left—excavating and shoring to set up for a jacking operation to install water main. Below—concrete conduit pipe is forced through the earth under a railroad track by hydraulic jacks.



- ★ 1,178 feet of 48-inch diameter pipe in Bryn Mawr Avenue between Northwest Highway and Mulligan Avenue.
- ★ 2,643 feet of 30-inch diameter pipe in Cumberland Avenue from Bryn Mawr Avenue to Foster Avenue.
- ★ 400 feet of 24-inch diameter pipe in South Frontage Road of the Southwest Expressway between Peoria Street and Green Street.
- ★ 1,504 feet of 24-inch diameter pipe in the area of the Southwest Expressway between Federal Street and Princeton Avenue.
- ★ 3,016 feet of 36-inch and 645 feet of 48-inch diameter pipe in Federal Street from 26th Street to Archer Avenue.
- ★ 3,325 feet of 30-inch diameter pipe in 47th Street from Shields Avenue to Union Avenue, in Shields Avenue from 46th Place to 47th Street and in 46th Place from Wells Street to Shields Avenue.
- ★ 814 feet of 24-inch diameter pipe in E. North Water Street from St. Clair Street eastward.
- ★ 1,832 feet of 54-inch diameter pipe in Halsted Street from Cabrini Street to Roosevelt Road and in Roosevelt Road from Halsted Street to Peoria Street.
- ★ 1,360 feet of 48-inch diameter pipe in LaSalle Street from Lake Street to Kinzie Street.

Division forces also maintained in a good state of repair, the 4,073 miles of pipe, 41,770 valves and 45,000 fire hydrants that make up the water distribution system of the City.

The Plumbing Inspection Section of the Division made a total of 135,805 inspections in 1964. Of primary interest to the inspectors was the checking of the distribution system to make sure that it in no way was connected at any point to a source that would contaminate the water supply. Inspectors also checked the plumbing fixtures on properties to discover water-wasting leaks and followed through to see to it that the owners took steps to eliminate such leaks when they were found. The criteria governing all plumbing inspections are based on the public water supply requirements as stated in the various provisions of the Municipal Code of Chicago.



A 48-inch diameter riser being constructed in the LaSalle Street Tunnel just south of the Chicago River will connect main in tunnel to main in LaSalle Street.

Earth is removed from the conduit pipe through which a 48-inch diameter water main is to be installed.



Installing 54-inch diameter pre-stressed concrete water main in south Halsted Street.



METERING

The number of water meters in service in Chicago reached a total of 160,354, of which 3,147 were installed on water services during the year.

An inspector from the Division supervised the testing of 2,850 new meters at the plants of manufacturers to determine compliance with specifications before shipment to the Division. Testing and acceptance of meters in this way, rather than after delivery at the meter shop, has resulted in significant dollar savings in terms of labor and shop equipment required for this work.

At year end, consideration was being given to changing the criteria governing the installation of meters on assessed-rate accounts so as to step up the meter installation program and increase the number of properties controlled by meters.

The activities of the Division embrace both field and shop work. The staff tested a total of 21,125 meters in the shop during the year and of these 16,409 had to be completely reconditioned, requiring the tearing down of each meter, cleaning each part, replacing defective



Some of the 21,125 water meters that were tested during the year by the Meter Division.

parts, reassembling the meter and testing it for accuracy. In addition, 18,580 meters were repaired in the field at the site of installation.

The controlling of and the keeping of a detailed record on each water meter in service is also an important part of the work of this Division.

ASSESSING, BILLING & COLLECTING

Long-standing Department policy calls for the use of the most modern methods and equipment applicable in its various activities. In this connection, during the year exhaustive studies were made to determine the feasibility of converting our present electronic machine system of billing to a computer system. Preliminary conclusions indicate that the computer system will enable the Collection Division to function at an increased level of speed and effectiveness in the billing of water charges. Furthermore, complete information on each customer account would be stored in the vast memory system providing quick access to account data for the

Electronic calculator used in billing the 508,270 water accounts on the books at the end of 1964.



use of management and engineering staffs. Periodic analysis of water consumption by area, type of property, class of user, etc. would be easily obtained. It is expected that a commitment to obtain the latest computer-type system for this purpose will be made in the near future.

There were 4,247 new water accounts placed on the books during the year, bringing to 508,270 the total number of accounts serviced by the Collection Division. Of this total, 347,916 were assessed-rate accounts and 160,354 were metered-rate accounts.

The gross cash collections made by the Division for the Water Fund during 1964 amounted to \$55,987,421.08, an increase of \$287,989.92 over 1963. The total collections included \$11,812,294.08 from assessed-rate accounts, \$43,950,028.06 from metered-rate accounts, \$76,559.28 from sewer rental accounts for property outside the corporate limits of the City and \$148,539.66 from miscellaneous sources.

Field men made 68,623 inspections for assessment purposes, 8,599 inspections to resolve complaints of excessive water bills, leakage and misuse of water and 64,815 field visits to obtain collections on delinquent accounts. Field men collected a total of some \$697,965 on these delinquent account visits during the year. Division personnel made 1,183,953 visits to properties to obtain meter readings.

CAPITAL

IMPROVEMENTS

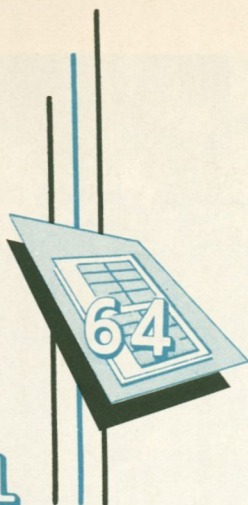
EXPENDITURES

...1964

EXPEND OVER \$22 MILLION FOR CAPITAL IMPROVEMENTS IN THE WATER SYSTEM IN 1964

During 1964, a total of \$22,468,089 was expended for the improvement of plants and facilities of the Chicago Water System. Expenditures for the principal projects were \$10,739,454 for construction projects at the Central District Filtration Plant, \$3,154,314 for construction projects to expand the South District Filtration Plant, \$6,024,284 to construct new water mains, \$1,642,657 to construct improvements in the 11 pumping stations and \$665,812 for tunnel construction projects.

THE CHICAGO WATER SYSTEM'S PRELIMINARY FIVE-YEAR PROGRAM OF CAPITAL IMPROVEMENTS, 1965-1969, CALLS FOR AN EXPENDITURE OF \$54,971,000.



FINANCIAL STATEMENTS*

WATER WORKS FUNDS

BALANCE SHEET

December 31, 1964

ASSETS

Utility Plant in Service	\$344,463,196
Less Reserve for Depreciation	65,606,529
	<u>\$278,856,667</u>
Work in Process	123,240,607
Net Fixed Assets	<u>\$402,097,274</u>
Equity in Working Capital Funds	8,328,885
Cash—Restricted for Capital Expenditures	13,088,414
Cash—Unrestricted	4,772,986
Accounts Receivable	3,542,866
Inventories	752,941
Total Assets	<u>\$432,583,366</u>

LIABILITIES AND CITY EQUITY

City of Chicago Equity	\$261,857,345
Certificates of Indebtedness Outstanding	163,000,000
Advances in Aid of Construction	389,885
Accounts Payable	6,163,115
Accrued Interest Payable	1,173,021
Total Liabilities and City Equity	<u>\$432,583,366</u>

EXPENDITURES FOR CAPITAL IMPROVEMENTS

Revenue and Water Certificate Funds Combined

Water Mains and Appurtenances	\$ 6,024,284
Central District Filtration Plant	10,739,454
South District Filtration Plant	3,154,314
Tunnels	665,812
Pumping Stations	1,642,657
Design	241,568
	<u>\$ 22,468,089</u>

INCOME STATEMENT

Year Ending December 31, 1964

Revenues:	
Water Sales	\$ 55,495,529
Other Operating Revenues	722,518
Non-operating Income	420,054
Total Revenues	<u>\$ 56,638,101</u>

Expenses:	
Operating Expenses Excluding Depreciation	\$ 35,427,022
Depreciation	5,658,000
Interest on Certificates of Indebtedness†	2,408,101
Other	38,219
Total Expenses	<u>\$ 43,531,342</u>

Net Income for Year (Invested in Capital Improvements)	\$ 13,106,759
City of Chicago Equity—January 1	247,971,554
Surplus Adjustments, Net	779,032
City of Chicago Equity—December 31	<u>\$261,857,345</u>

*These statements represent a preliminary financial summary of the water funds and are not final. Final statements will be included in the City Comptroller's report for 1964.

†Net of interest charged to construction: \$3,178,461.



Sheeting and bracing installed along section of the 15-foot California Avenue sewer near 35th Place.



SEWERS

One hundred and thirty years ago the trustees of the incorporated town of Chicago authorized the expenditure of sixty dollars to drain State Street. At that time the primary concern was surface water drainage so that all that was done was to dig trenches which channeled storm water runoff to the Chicago River. Later, these trenches were eliminated and replaced by wooden sewers having a triangular cross-section.

From these very modest beginnings the public sewer system of Chicago has grown to a vast drainage network that, by the year end, included approximately 3,980 miles of sewers ranging in size from ten-inch diameter tile pipe to 21.5 by 19.3 foot horseshoe-shaped reinforced concrete conduits, 207,313 catch basins and 142,470 manholes. In 1964, 31.24 miles of sewers, 1,398 catch basins and 881 manholes were constructed and added to the System.

To maintain adequately a public sewer system of this scope is a major operation. The alternate freezing and thawing cycles plus the heavy impact of vehicular traffic places undue stress on the sewer, catch basin and manhole structures which results in deterioration, particularly in the old brick sewers. To do the job in 1964 required 10,194 repair jobs, the scraping of 6,111,902 feet of sewers, the cleaning out of 247,935 catch basins and the flushing of many miles of sewers. The catch basin cleaning and the sewer scraping and flushing operations must be intensified in industrial areas where large

Sewer repair—showing use of brick collar to join old and new sewer work.



amounts of gritty and greasy dirt and sometimes volatile liquids find their way into the System. The repair and cleaning operations have been greatly facilitated by the addition of modern equipment during the last several years, such as power rodding machines, orange peel catch basin cleaners, sewer scraping machines, tank truck flushers, truck cranes, front-end loaders and dump trucks. In 1964 two modern fifteen-ton capacity truck cranes, eight dump trucks, three front-end loaders and a number of centrifugal pumps were added to the equipment pool.

The Chicago System is a "combined sewer system" in which are transported (1) the dry weather flow carrying sanitary wastes and surplus water from homes, commercial buildings and industrial plants, and (2) the storm water flow from roof, street, sidewalk, parking area and other impervious surfaces. The City sewers serve as a transportation system carrying the flow to the interceptor sewers of the Metropolitan Sanitary District of Greater Chicago which, in turn, carry it to the District's sewage treatment plants. In some cases, during heavy storms the storm water only, is allowed to bypass the interceptor sewers to outfalls discharging into the Chicago River and the Sanitary and Ship Canal.

The Chicago System is a gravity flow system and proper pitch or gradient must be meticulously designed into the System by the engineers to create sewer flows which have self-cleansing velocities that will carry the dirt and debris along in the water rather than to allow it to settle out and build up in the sewer.

Mason inspectors and house drain inspectors of the Bureau made 202,652 inspections to safeguard the sewer system by seeing to it that proper connections were made to the mains by licensed drain layers, abandoned house drains were properly sealed when buildings were wrecked, repairs to private drains were made correctly and devices such as back water valves and sump pumps were properly installed, all in accordance with the requirements of the Municipal Code of the City of Chicago. Inspectors also handled 23,621 complaints during the year. The handling of complaints is of considerable import to management here because it often alerts the staff to hazardous situations before an accident occurs, or to areas which may need special maintenance work or additional sewer capacity.

The Bureau maintains the City System of bench marks and in 1964 survey crews ran 138 miles of precise levels to establish eighteen new bench monuments and also to establish 198 street grades which were approved by the City Council. Bench marks are used by engineers, architects and others to control grades for all new construction work in Chicago.



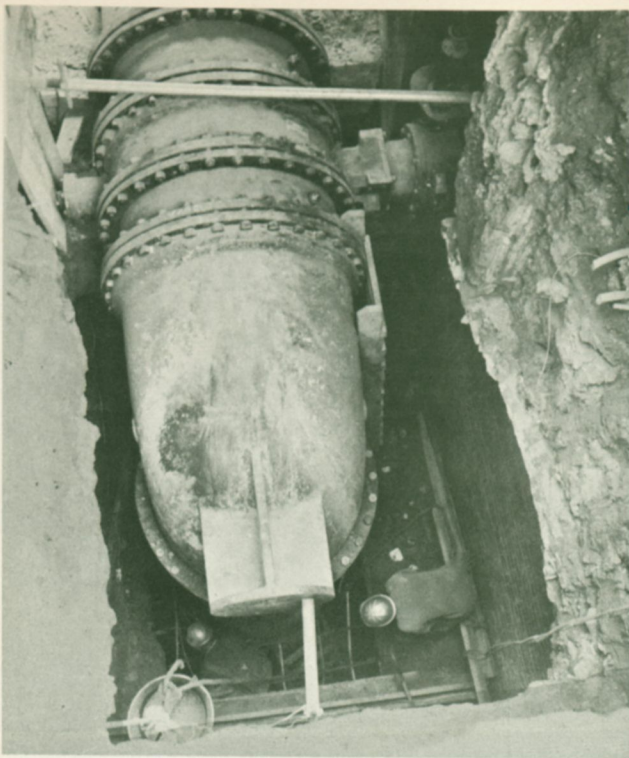
Above — hand work in cleaning a 7-foot sewer in conjunction with—Below left—special sewer scraping machine developed by Bureau of Sewers.



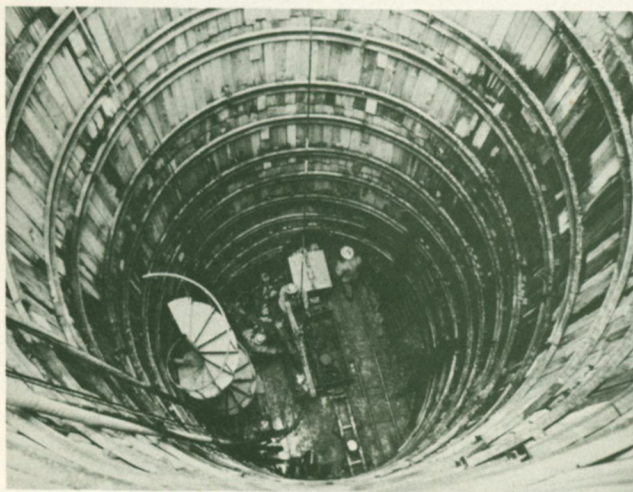
Above — installing sheeting and bracing in shaft over damaged brick sewer before making repairs.



New 48-inch concrete sewer constructed on special steel cradle to prevent vertical or lateral movement due to nearby construction work.

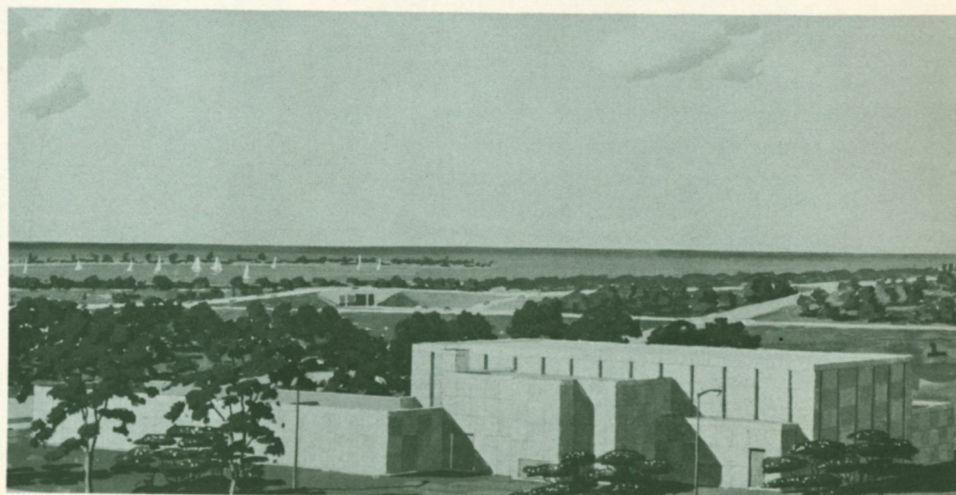


In the five year period 1965-1969, an estimated \$25,781,000 will be expended for water main construction.

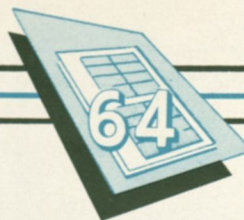


The 1965-1969 Five-Year Program calls for the expenditure of \$1,971,000 for water tunnel and shaft construction.

An estimated \$1,795,000 has been allocated in the 1965-1969 Program for the construction of the new Lake View remote controlled electric pumping station.



THE FUTURE



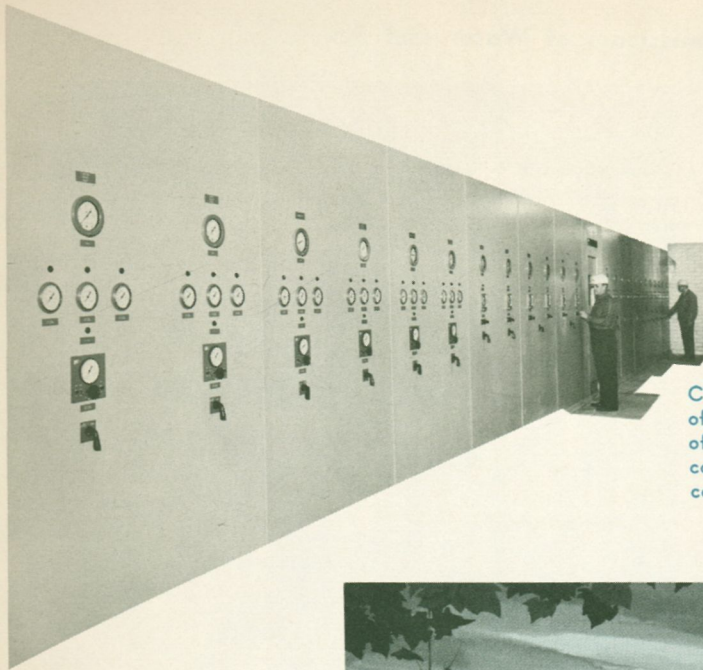
PRELIMINARY FIVE-YEAR PROGRAM OF CAPITAL IMPROVEMENTS FOR THE CHICAGO WATER SYSTEM 1965-1969

Each year, in cooperation with the Departments of Public Works and City Planning, the Department of Water and Sewers develops a water system capital improvement construction program for the coming five years. The preliminary program developed for the five-year period, 1965-1969, calls for a total estimated expenditure of \$54,971,000.

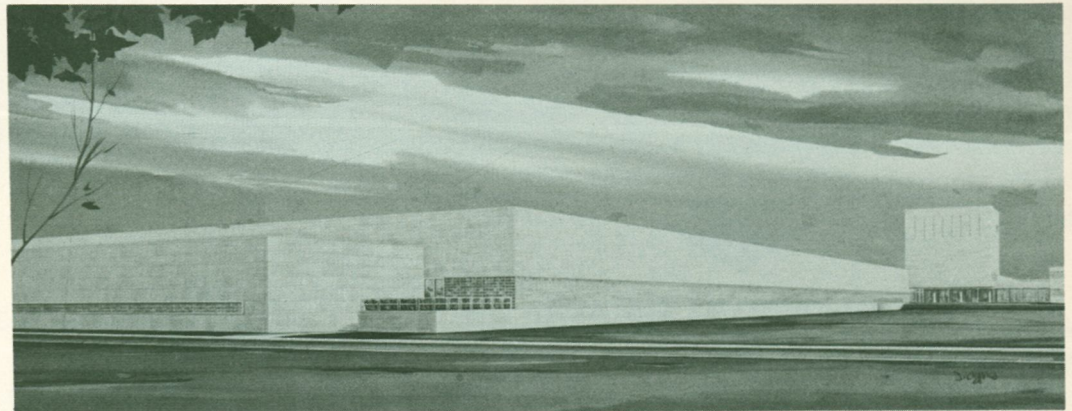
The proposed capital improvement expenditures in this program include \$1,971,000 for water tunnels and shafts, \$6,446,000 to complete the new Central District Filtration Plant and \$5,621,000 to complete the South District Filtration Plant expansion program, \$15,152,000 for pumping stations, including \$1,795,000 for the new automatic remote controlled Lake View Pumping Station, and \$25,781,000 for water mains.

All of the major improvement projects included in this five-year program are designed to increase the capacity of the Chicago Water System to keep its capabilities in gear not only with current domestic, industrial and commercial demands but also with those of the future through the year 1980 and beyond.

This 1965-1969 program is subject to annual revisions and approval by the City Council of Chicago. The proposed expenditures are preliminary estimates. When the program is finalized, it will be included in detail in the City of Chicago Five-Year Capital Improvement Program, 1965-1969, published by the Department of City Planning as approved by the City Council.

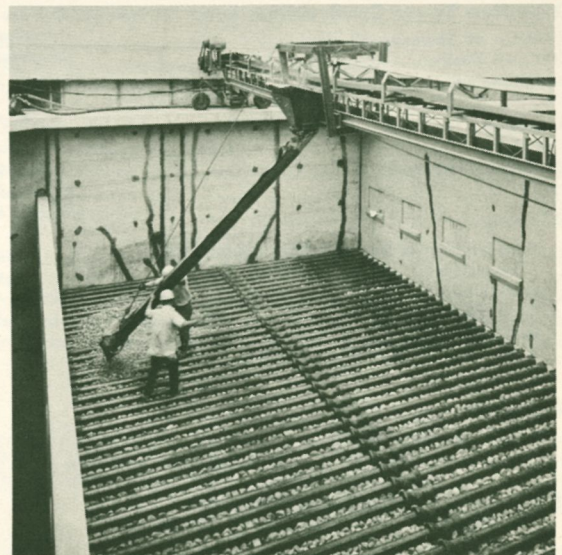


Chlorinator panel at the new Central District Filtration Plant—one of the seven panels which are directly concerned with the control of plant operations. When the installation of all of the electronic controls is completed in 1965, the Plant will be one of the most completely automated water filtration plants in the world.

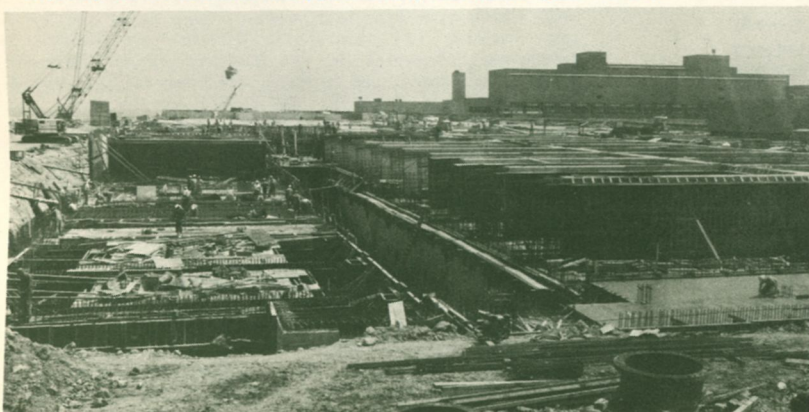


Artist's rendering of the new addition to the South District Filtration Plant.

Placing of the second layer of filter gravel in one of the 40 new filter beds being added to the South District Filtration Plant.



Construction of new filters and settling basins at the South District Filtration Plant. When the expansion program is completed, the Plant will have a rated capacity of 480 million gallons a day and the peak capacity will be increased to approximately 800 million gallons a day.



DEPARTMENT OF WATER AND SEWERS

JAMES W. JARDINE, Commissioner of Water and Sewers

BUREAU OF SEWERS

Edward A. Quigley.....Deputy Commissioner for Sewers
Thomas E. Kilroe.....Asst. Deputy Commissioner for Sewers
A. J. Schafmayer.....Chief Engineer

INSPECTION

Edward W. Hallauer.....Assistant Chief Engineer

ENGINEERING

Charles E. Benson.....Engineer
David Goldberg.....Engineer
Thomas Bresnahan.....Engineer

ARTERIAL REPAIR AND CLEANING

Edward Gill.....Superintendent

DISTRICT CLEANING

John Kilroe.....Superintendent

BUREAU OF WATER

Raymond D. Johnsos.....Deputy Commissioner for Water
H. H. Gerstein.....Chief Water Engineer
Robert O. Waller.....Asst. Chief Water Engineer

PUMPING

J. L. Weeks.....Engineer of Water Pumping
D. E. Kennedy.....Asst. Engineer of Water Pumping

PURIFICATION

O. Gullans.....Engineer of Water Purification
J. C. Vaughn.....Asst. Engineer of Water Purification

DISTRIBUTION

J. T. Garrity.....General Superintendent
T. F. Foley.....Asst. General Superintendent
W. R. Lemm.....Engineer

METERING

J. J. Gilleran.....Acting Superintendent

COLLECTION

Edward A. Nihill.....Superintendent
John J. Malone.....Asst. Superintendent



1964 MAJOR SEWER STATISTICS

Existing Sewer System:

Miles of Sewers	3,980.15
Catch Basins	207,313
Manholes	142,470

1964 New Sewer Construction:

Miles of Sewers—all sizes	31.24
Catch Basins	1,398
Manholes	881

Inspections	202,652
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Complaints Handled	23,621
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Repairs:

Total Number of Sewer System Repair Jobs	
Completed	10,194
Main Sewer Breaks	442
Catch Basins	7,493
Manholes	2,124
Gutter Grates and Basin Outlets	135

Cleaning:

Sewers Scraped—Feet	6,111,902
Catch Basins Cleaned	247,935

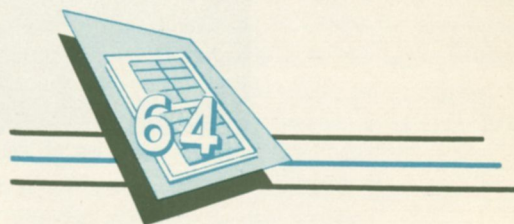
Street Grades Established and Approved by City Council	
	198

Standard Bench Monuments and Ordinary Benches Established	
	18

Standard Bench Monuments Constructed	0
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Receipts:

House Drain Permit Fees	\$ 130,680
Other Permit Fees	55,875
Special Deposits	86,524
Out-of-town Sewer Connection Fees	76,559
Drain Layers' License Fees	39,900
Total Receipts	\$ 389,538



ADMINISTRATION AND FUNCTIONS

The Department of Water and Sewers is divided into two major units—the Bureau of Water and the Bureau of Sewers.

The Bureau of Water operates and maintains the Chicago Water System which furnishes pure, filtered water to all of Chicago and 61 suburbs. The Bureau is composed of five Divisions: (1) the Purification Division which operates the two largest water filtration plants in the world and supervises the treatment of the water to insure its safety and palatability; (2) the Pumping Station Operation Division which operates four water intake cribs and 11 pumping stations; (3) the Water Distribution Division which operates and maintains the distribution system and constructs additions and betterments thereto; (4) the Meter Division which operates the meter repair shops, installs large meters, inspects and makes repairs of meters in the field and maintains meter records and (5) the Collection Division which reads the meters and bills, collects and accounts for water charges.

The Bureau of Sewers operates and maintains the Chicago public sewer system. The Bureau is composed of five Divisions: (1) the Engineering Division which plans and designs sewer repairs, extensions and betterments; (2) the Cleaning Division which scrapes and flushes sewers and cleans catch basins on a district basis; (3) the Repair Division which makes repairs to the sewer system on a district basis; (4) the Motor Fuel Tax Division which does both repair and cleaning work on arterial highway sewers and (5) the Inspection Division which supervises sewer construction and installation of connections.

1964 MAJOR WATER STATISTICS

Population and Area Served

(Based on reliable estimates)

Population supplied:

Chicago (1960 U.S. Census 3,550,404)	3,543,000
Suburban (Year-end census as revised)	993,000
Total	4,536,000

Area served (in square miles):

Chicago	226
Sixty-one suburbs	169
Total	395

Per Capita Consumption

	Gallons Per Day
Chicago	256
Suburban	135
Average	231

Chemical and Physical Qualities of Water

Total hardness (as parts per million Calcium Carbonate)....	130
Water temperatures: Intake (Dever Grib)	
Average	48.7°F.
Maximum	71.0°F.
Minimum	32.0°F.

Pumpage

Annual	Gallons
Chicago	332,476,000,000
Suburban communities and industries (metered)...	50,241,000,000
Total*	382,717,000,000

*(Amount through

Western Ave. Reservoir.....1,550,000,000)

Annual Metered Consumption

in Chicago (48.39%† of Chicago pumpage)....161,386,000,000
†(Percentage of Revenue
from Metered rates 78.82 %)

Daily

Total daily average	1,045,670,000
Maximum day, June 30	1,529,970,000
Maximum hour (rate) June 29, 3:00 P.M.	1,888,000,000
Daily Average—Chicago	911,212,000
Daily Average—Suburban	134,458,000

Purity Control

Laboratory samples examined:

Bacteriological Laboratory	44,812
Chemical Laboratory	184,853
Microscopically for plankton	7,653
Electron Microscope	4,347
Total samples examined.....	241,665

Bacteriological Results

Annual average coliform organisms per 100 ml*

	South District (filtered)	North & Central District (chlorinated only)
Raw	110.2	53.1
Plant outlet	0.001	—
Pumping stations	0.01	0.23
Distribution system	0.02	0.22

*(U. S. Public Health Service Standard for safe drinking water permits a maximum average of 1.0 coliform organisms per 100 ml)

Purification Treatment

	Gallons
Complete Filtration Treatment	199,654,000,000
Chlorination Treatment only	183,063,000,000

Chemicals Applied—Tons

	Filtration Treatment SDFP	CDFP	Chlorination only
Chlorine	1,525	390	1,638
Aluminum Sulfate (17 % Al_2O_3)	5,139	2,389	—
Activated Carbon	1,883	—	—
Lime	2,491	—	—
Ferrous Sulfate (as $FeSO_4$)	2,174	—	—
Anhydrous Ammonia	145	—	—
Sodium Silicate	69	—	—
Hydrofluosilicic Acid (23 %)	2,610	—	4,509
(As Fluorine)	475	—	821

Supply

Crib intakes in service	4
Emergency shore intake	2
Miles of water supply tunnels under lake and land (6 to 16 feet in diameter)	74.6

Pumping

Pumping stations	11
Pumps available for service	55
Installed pumping capacity (Million gallons per day)	3,030

Annual Pumpage

	Million Gallons
By electrically driven pumps	154,688
By steam driven pumps	228,029
Total annual pumpage	382,717

Coal used by steam powered pumps (tons)	127,734
Electric power used by electrically powered pumps. (kilowatt hrs.)	77,031,800

Distribution

Water Mains: (in miles)

In use—December 31, 1964	4,073.29
Extended	24.00
Abandoned	9.17
Net addition to system	14.83
Diameter of pipe (inches)	4 to 60

Fire Hydrants:

In use—December 31, 1964	45,451
Installed	207
Abandoned	127
Net Increase	80

Gate Valves:

In use—December 31, 1964	41,770
Installed	564
Abandoned	253
Net Increase	311

Pressure range in mains (lbs. per square inch)	22-55
Average pressure at curb (lbs. per square inch)	38
Miles of pipe tested for underground leakage	2,296.69
Premises inspected—house to house leakage survey	72,326
Repaired main breaks—4 inch to 30 inch in diameter	262

Meters:

In service—December 31, 1964	160,354
Installed by master plumbers	1,326
Installed by Water Distribution Division	1,821
Total	3,147
Removed	2,678
Net increase	469
Repaired on premises	18,580
Repaired in shops	16,409
Tested	21,125
Non-metered (assessed rate) services	347,916
Total Services (assessed & metered)	508,270

Supplements covering complete 1964 water or sewer statistics are available upon request.

ANNUAL REPORT • DEPARTMENT OF WATER & SEWERS • CITY OF CHICAGO



UNIVERSITY OF ILLINOIS-URBANA



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